Experimental Aircraft Models

"Enhancing the Homebuilt Experience"

Radio Control Scale Model

Glasair SII / Glasair III

Scale: 1= 3.5 (28% Full Size)
Wingspan: 80" (2032 mm)
Wing Area: 1024 in^2 (66.1 dm^2)
Flying Weight: 12 lbs (5.04 kg)
Wing Loading: 27 oz/ft^2
Length: 70" (1778 mm)
Radio: 5 Channels with 7 servos
Engines: 1.08 – 1.2 cu in 2 Cycle
1.20 – 1.4 cu in 4 Cycle

WARRANTY

Experimental Aircraft Models, LLC (EAM) guarantees this kit to be free from defects in material and workmanship. The warranty does not cover individual parts damaged by modification or abuse. In no case will EAM's responsibility or liability exceed the original purchase price of the kit. EAM reserves the right to change or modify this warranty at any time.

EAM assumes or accepts no liability for the manner in which this model aircraft is used by the user, in any condition of assembly. By the act of purchasing this kit, the purchaser and any subsequent user accepts full responsibility and all resulting liability.

If the purchaser is not willing to accept the above liability associated with the use of this model aircraft, the purchaser is advised to return this kit immediately to the source from where it was obtained.

Please read this manual thoroughly before starting assembly. It includes critical assembly instructions and warnings in regards to the safe and enjoyable use of this scale aircraft model.

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About Your Model: You have purchased 1 of a limited production run of Glasair SII / III RC model kits in the world. You have a very unique model of an Experimental

aircraft. In the United States, 'Experimental Aircraft' are aircraft that are 51% or more built by an individual (usually at home) and fly under an FAA issued "Flight Permit", rather than "Certification". During the past 20 years the most advanced designs in civil aviation aircraft have come from the 'Homebuilt' arena where, without the expense of certification and manufacturers liability insurance, aircraft of amazing performance and safety could be designed and offered to the public.

In our mission to support the homebuilder with a scale model of an aircraft project that may have consumed hundreds/thousands of hours to complete, we have brought together full-scale aircraft kit airframe manufacturers with a state-of-the-art world class ARF (Almost Ready to Fly) model manufacturer. Our intent is to provide as scale a model as possible that is as ARF as possible - within the confines of limited production run sizes and knowledge that a builder will likely customize to match their own aircraft. In that sense, this product caters more to the full scale builders, and scale modelers, than it does 'out of the box' flyers.

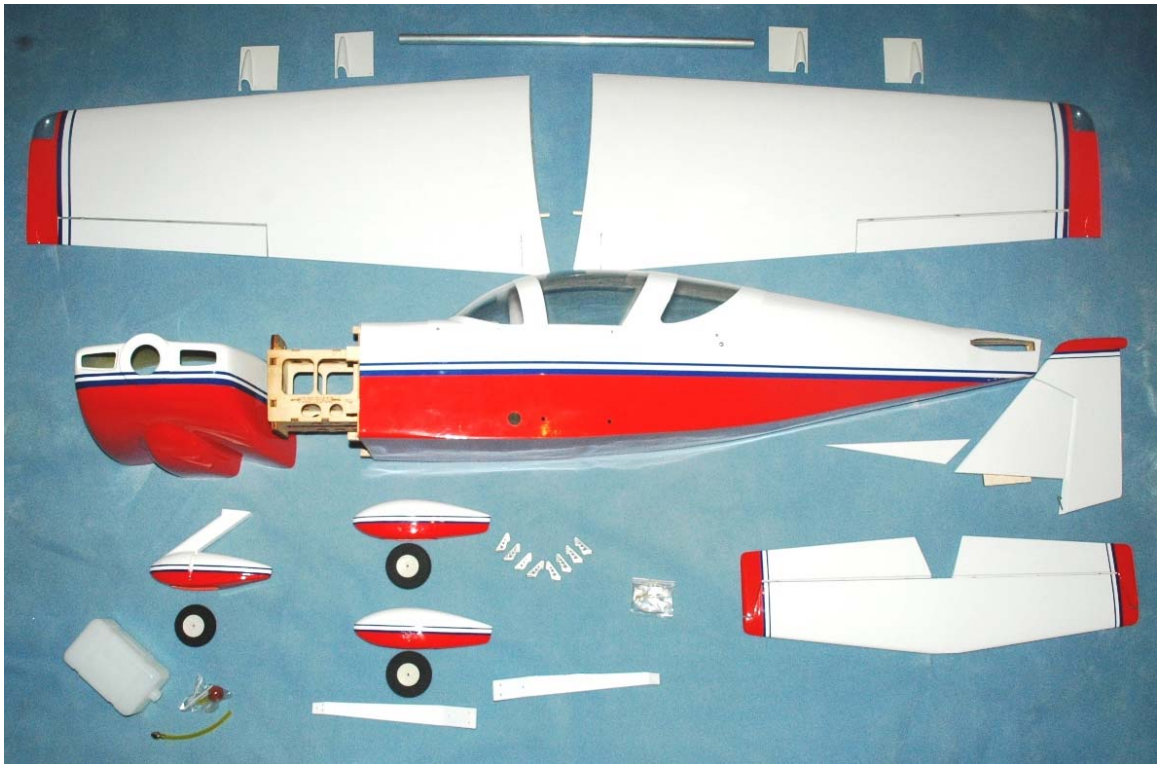
Some interesting details about the production of this model; We control the entire process of the model construction, starting with the direct import of balsa logs from Ecuador, to hand carving the fiberglass plugs and lay-up of the fiberglass components. The canopy molds are also hand carved and the vacuum forming is all done 'in-house'. You get to make similar choices as the Glasair homebuilder: type and size of engine, fixed gear or retracts, as well as many other touches that customizes their personal aircraft, or your model. In addition our Glasair SII / III model will also accommodate a lighting kit in the wing tip

A final point: Because the model is so special and the volumes (by model standards) so low, *we need your help*. We have tried our absolute best to get everything right the first time. If there is something during the construction and flying of the model that you feel could be done more easily or better, we'd like to know. This is how it's done in the full size experimental aircraft world, and we want to be sure that the same spirit is carried on in smaller scale. Full scale Glasair builders are continually finding ways to improve the full size aircraft, and there is no reason why modelers should not have the same ability to contribute to a better product.

We sincerely appreciate your vote of confidence in purchasing our rendition of the Glasair SII / III and truly wish you the best of enjoyment. Please feel free to e-mail us with kit comments from our web site at www.rchomebuilts.com or call us toll free 888-968-7251.

Andrew Kondor
Managing Director –
Experimental Aircraft Models, LLC

GENERAL ASSEMBLY NOTES – *Before you Begin!*



Congratulations on your selection of the Glasair for your aero modeling project! This manual is written for modelers with some prior RC model building experience and tools. There is always a question of how much detail should the manual include? If something is unclear then *please contact us for help*. Similarly, your Glasair is supplied with quality hardware, but some additional parts (listed below) are needed. Again if you need some help in selecting what you need *contact us*.

One of the first things to determine is exactly WHAT version of the Glasair are you going to build? Just as the homebuilder customizes their personal aircraft, your Experimental Aircraft Models kit enables you to choose between the Fixed Gear or Retract equipped Glasairs:

- ☐ The Glasair S II or Super II line offers the RG (Retractable Gear), the FT (fixed tricycle gear). There is also the TD (Tail Dragger) variant – but that is beyond the realm of your new EAM kit – *unless you want to customize!*
- ☐ *All* Glasair III's have retractable gear

Thus if you build your model with a fixed trike gear it will be a Glasair SII-FT. If you build it with the optional Robart retracts it will be either a Glasair III, or a Glasair Super

II RG! For the complete lineage of the Glasair series see their website at www.glasairaviation.com. No matter what you call it you have your hands on a slick model of a very impressive full size aircraft!

Please note that we use aircraft terminology in our instructions. Specifically 'Port' is to Pilot's left, 'Starboard' (or Strbd) is to Pilot's right, 'Forward' is to the front and "Aft" is to the rear. No matter how you may have the model turned "Port" is always the left side of the aircraft as the pilot sits in the cockpit facing forward.

A note about the covering - Your Glasair is covered in 'Oracover' – commonly known as 'Ultracote' in the U.S. This is a high quality material, but through temperature changes during shipping, the model may show wrinkles. This is normal. This symptom is also more visible in that the model is fully balsa sheeted. The material can easily be tightened by the application of heat from a hair dryer/heat gun or hot iron. If using an iron, a piece of lightweight cotton (e.g. sheeting) placed between the iron and the covering helps to even the heating. Pressing lightly will transfer the heat to the covering, shrinking the material. Piercing a bubble with a pin and rubbing the hot area with a cloth further helps remove the wrinkles.

Oracover is a very slippery finish that that resists adhesive bonding. It *must* be removed from any joint to be glued. Failure to remove the covering from glue zones will result in failure of the affected glue joint and likely damage or destroy your model.

The recommended engines are a 1.08-1.20 two stroke or 1.20-1.40 four stroke. Experimental Aircraft Models discourages the use engines larger than this range. The Glasair is an aerodynamically clean design that simply does not require larger than the recommended engines. Some other notes on engines: most of the engines in the recommended size range weigh roughly the same - 28-34 ounces. Using a lighter engine will likely require making up the difference with lead weight. Using a larger/heavier engine might mean that lead will have to go in the tail!

For 2-stroke engines the standard muffler will be very difficult – or impractical to use because it will project way out of the cowl and might also require modifying the firewall for clearance. For this reason 2-strokes should be fitted with a side mount or "Pitts Style" muffler to keep the installation simple and preserve clean line of the cowl. The mufflers on 4-strokes are generally easier to package.

The Glasair is supplied with an assortment of hardware, but a lot of modelers have their own preferences. A couple thoughts to keep in mind:

- ☐ Keep close track of all the little screws and hardware sets located within all the large component bags. It can be easy to misplace these items – not that WE have

ever done that! Collect these items in a medium size plastic container or zip-lock bags to keep them safe until used. If you tag or mark them then you might even remember where they came from!

- ☐ The Glasair is supplied with METRIC hardware. Most hardware sold in America is English. Unfortunately some of the English and metric hardware are just close enough that they can be mixed – usually with disastrous results! *Do not mix metric and English thread fasteners, they WILL fail.*
- ☐ The supplied elevator and rudder pushrod clevis' are 2mm and adequate for the job at hand. However the Glasair is IMAA legal and if you fly it at an IMAA event they will likely require that you have either 4-40 or 3mm size pushrod hardware.

The fixed-gear Glasair requires a 5 (or more) channel radio system with 7 standard size servos. We like using ball bearing servos for their durability. Add retracts and you need a 6th channel and at least one more servo. Technically the Glasair *could* be flown with a 4-channel radio with 5 servos, with fixed gear, and the flaps locked in the neutral position – *but where's the fun it that?*

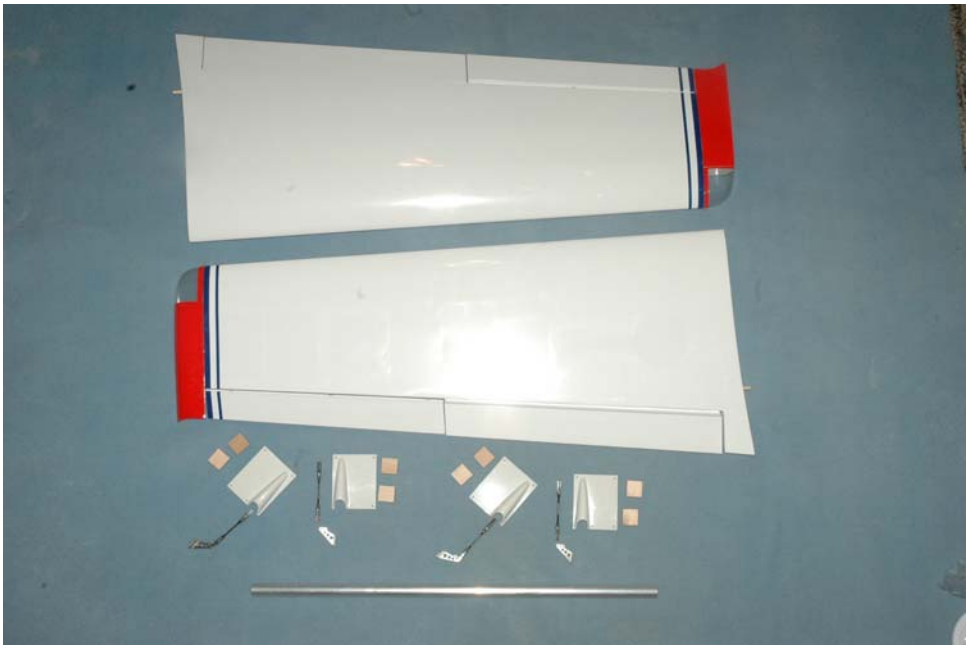
Additional components you may need from the hobby shop:

- ☐ CA Adhesive (Thin)
- ☐ CA Adhesive (Medium)
- ☐ Epoxy (30 minute cure)
- ☐ Silicone Seal/Adhesive
- ☐ Heavy Duty Servo Lead Extensions (2) 450mm (18") (for ailerons) with JR Plug (recommended)
- ☐ Heavy Duty Servo Lead Extensions (2) 150mm (6") (for flaps) with Futaba Plug (recommended)
- ☐ (1) "Y"-Harness: Heavy Duty (for ailerons) with JR Plug (recommended)
- ☐ (1) *"Reversing"* Y Harness: Heavy Duty (for flaps) with Futaba Plug (recommended)
- ☐ 4-40 or 3mm Pushrod Hardware (optional, required for IMAA events)
- ☐ Remote glow plug lighter (optional)
- ☐ Fuel Filler valve (optional)
- ☐ 1 or 2 - Pilot Busts (optional)
- ☐ Small jar fuel proof paint for under the cowl & touch-ups (optional)
- ☐ Lighting Kit (optional, available from Kondor Model Products).

On the Y-harnesses: if you get one of them with the JR plug and the other with a Futaba plug then they can be mated to the same style (either JR or Futaba) connector on the Servo Extension end to prevent cross wiring. If both plugs are the same style, then you will have to mark each lead with a "flag" identifying its purpose.

WING ASSEMBLY

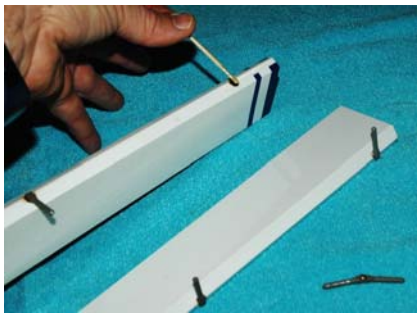
The flaps are already hinged and ready to go; however the hinge points in the ailerons must be installed. Next we'll install the servos on their mounts, install the control horns and linkages, wiring harnesses and finally install the servos in the wing.



Aileron Hinges

A "go slow" approach works best here. The best way to align the hinge points is to epoxy them into just the aileron, then after the epoxy cures, epoxy the hinges to the other surface.

1. Remove the aileron and remove all of the hinge points. Mix a small batch of epoxy and using a toothpick drop some epoxy down into each hinge pocket, hold the surface with the hole pointing up so the epoxy can flow down into the hole. Put a second drop in each pocket if needed. One at a time, push the hinge points into their pockets if the epoxy purges out of the hole, then back out the hinge point, wipe the excess epoxy off, then reinsert it. Inspect each hinge to see that it is square to the surface. Then pivot the hinge, and check again to see it is square. Press the surface up against a straight surface to assure the hinges are all seated at the same depth.



Port Aileron Hinges Installed☐, Starboard Aileron Hinges Installed☐

2. When the epoxy is cured, carefully check the movement of each hinge point. You may have to (carefully!) pop the movable end of the hinge point loose from any stray epoxy that has gotten into it. Go slowly until each of the hinges moves freely. Your servos and your battery pack will thank you!

Port Aileron☐, Starboard Aileron☐

3. Next step is to install the aileron to the wing. The hinge points do not bottom out on the wing side, so it is important that the hinge pocket be wetted out nicely. Install the hinge points onto the wing side, set the hinge gap to no more than 1 mm ($^{1}/_{32}$"). A good way to do this is by using a thin piece of balsa or thin cardboard as spacers to set the gap consistently. Use some tape on the aileron to hold the position, and then try to set the wing up on its trailing edge while the epoxy cures. That way, any excess epoxy pushed inside the wing should flow back and help lock the hinge point in place.

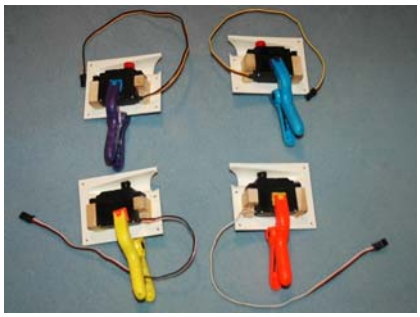
Port Aileron☐, Starboard Aileron☐

Wing Servos

1. Locate the four servo covers and eight mounting blocks. Note that two of the servo covers have the pushrod slot offset to one direction and the other two to the other direction. Rough-up the inside surface of the servo cover with some sandpaper to promote better adhesion of the servo mounting blocks.

Servo Covers Sorted & Prepped 1☐, 2☐, 3☐, 4☐

2. Position the servo by centering the servo output arm in the slot then use a spring clamp to hold it in position. OPTIONAL: put a dab of silicone seal on the servo before clamping the servo down; it will help retain the servo but still allow the servos to be popped off if needed for service. With the servos clamped in position epoxy the mounting blocks in close under the servo lugs.

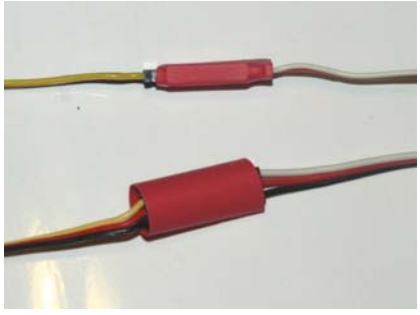


Servos & Covers Clamped 1☐, 2☐, 3☐, 4☐

3. After the epoxy cures, drill a 1.5mm ($^{1}/_{16}$") hole through each grommet and screw the servos to the mounting blocks.

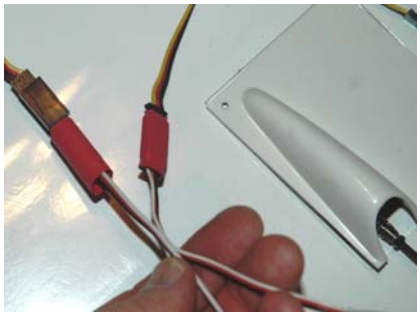
Servo Cover 1☐, 2☐, 3☐, 4☐

4. Next step will be to install the servo wire extensions. Each Flap servo needs a 150mm (6") extension, each aileron a 450mm (18") extension. Because these will be out of sight inside the wing, it is prudent to "safety" the connections. Shown here is a piece of shrink wrap tubing over the connector



joint. Another possibility is to use electrical tape, We have even seen successful installations that use a loop of dental floss to tie the connection together! How ever you do it, make sure the connection is retained.

Now is a good time to double check the operation of the servos and harnesses BEFORE you run the wiring through the wing! Use the Y-Harness for the aileron servos and the reversing Y-Harness for the flap servos so you can confirm the operation of the complete harness before you install the wiring.



RECOMMENDED: for the aileron servos, remove the output arms and displace them by rotating the arms one or two splines FORWARD of the centered position. This will provide differential throws (ailerons will move UP farther than DOWN) and somewhat reduce the need for rudder input when turning & banking.

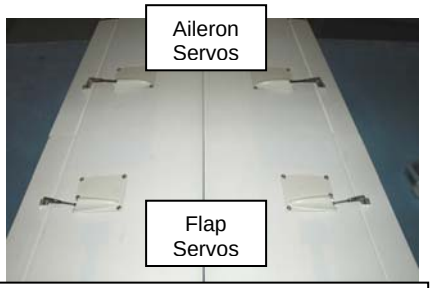
The Reversing Y harness is the simplest means to get both flap servos moving the same direction. Plug both flap servos into the Reversing Y, then - if needed - remove the servo arm from one servo and reinstall it so it matches the position of the other servo.

Port Flap Servo Extension Installed & Retained☐
Starboard Flap Servo Extension Installed & Retained☐
Port Aileron Extension Installed & Retained☐
Starboard Aileron Extension Installed & Retained☐
All Servos & Harnesses Checked for Operation☐

5. As shipped, the servo bays are covered over with Oracover. Use a sharp modeling knife to open up these bays, then use a trim iron to seal the edges of the Oracover to the servo bays.

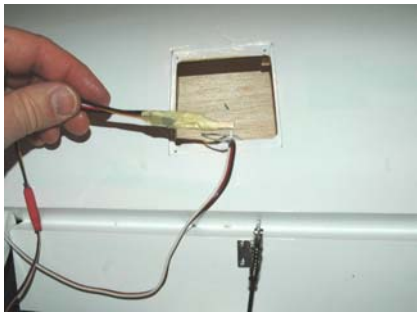
Port Wing Servo Bays Opened☐
Starboard Wing Servo Bays Opened☐

6. Next up is to route the servo wiring through the wing and get the servos in position so we can install the control linkages. Find the pull through string in aileron servo bay: it is wrapped and glued to a balsa stick. The other end is tacked inside the access hole in the wing root. Remember that the correct servo pair for each wing are the ones that when installed orient the bottoms of the servos toward the wing tip and the pushrod fairings both toward the wing root. Securely tape the aileron servo extension plug to



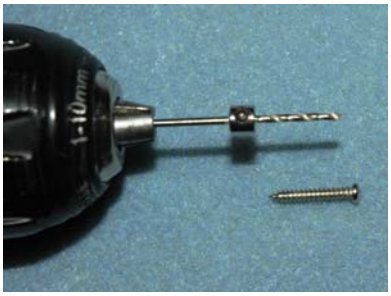
Wing Root: Tops of servos point this way

the little stick on the string. Keep it smooth and torpedo-like to make it easier to slip through the wing. Pull the lead through until it reaches the flap servo bay. Tape the flap servo lead to the aileron lead trying not to make the Torpedo any fatter – just longer. Continue pulling on the string, pushing on the harness, and jiggling the wing until the leads com out at the wing root. For now it's a good idea to tape the leads to the wing root so they do not inadvertently get pulled back inside the wing!



Port Aileron Servo Wiring Routed Through the Wing ☐
Port Flap Servo Wiring Routed Through the Wing ☐
Strbd Aileron Servo Wiring Routed Through the Wing ☐
Strbd Flap Servo Wiring Routed Through the Wing ☐

7. Assemble the clevis onto the aileron & flap links, and install each link onto a control horn. Align the horn and link with the servo arm, align the horn as far forward as possible WITHOUT overhanging the beveled edge, then drill a 2mm ($^5/_{64}$") hole for each control horn screw. NOTE: in order to prevent drilling through the control surface use a drill stop. The middle picture shows a wheel collar affixed over the drill bit to assure that the hole is drilled just as deep as needed for the screw.



Port Flap Horn☐, Starboard Flap Horn☐ Port Aileron Horn☐, Strbd Aileron Horn☐

8. Install the horns. With the rear-most screws, you might want to cut off the excess screw length and file off the burr – it looks better than that extra screw point poking through on the top!

Port Flap Horn☐, Starboard Flap Horn☐
Port Aileron Horn☐, Starboard Aileron Horn☐

9. Drill out servo output arms to 2 mm ($^5/_{64}$") to accept the wire pushrods.

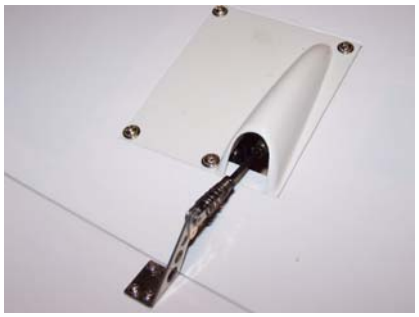
Port Flap Servo☐, Starboard Flap Servo☐

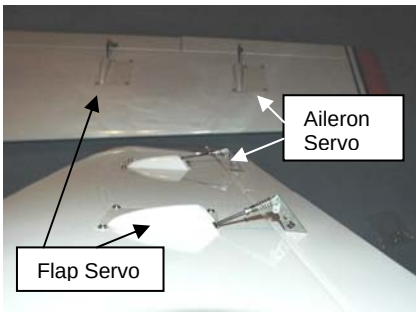
Port Aileron Servo☐, Strbd Aileron Servo☐

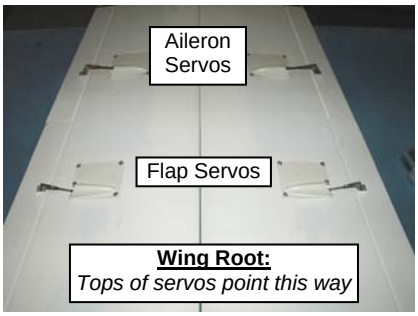
10. Unless you are using a computer radio with the ability to reverse-mix the flap servos, you will need a reversing Y-Harness for the flap servos. Frankly even with the computer, the reversing Y is the simplest means to get both servos moving the same direction. Plug both servos into the Reversing Y and make sure the servos are moving the same direction, then - if needed - remove the servo arm from one servo and reinstall it so it matches the position of the other servo. You might find this easier to do by temporarily plugging the flap harness into a centering channel, like the Aileron, Rudder or Elevator channel, and then set both servo arms to neutral. When you plug the harness back into the flap channel you should see the servos working together throughout the range of flap settings.

Port Flap Servo/Linkage☐, Starboard Flap Servo/Linkage☐

11. Before installing the installing the servo covers for the last time, give each screw hole a drop of thin CA and when dry drill it again with a 1.5 mm (1/16”) drill bit. Due to variations in production, you may have to elongate some of the holes in the cover to line up with the pre-drilled holes in the wing servo bay – do this if/as necessary and with care so as not to over-do it. Screw down the servo covers.







Port Flap Servo ☐, Starboard Flap Servo ☐
Port Aileron Servo ☐, Starboard Aileron ☐

FUSELAGE: FRONT END ASSEMBLY

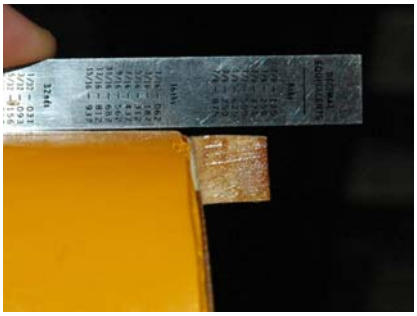
Here is another one of those builder selection choices. Because the dimensions on the engine mount are "square" it is possible to install the engine either side mounted (piston horizontal) or inverted – and we have customers who have done it either way. The installation we will show here is side-mounted; it hides the engine nicely and will make some of the subsequent assembly choices a little more straight forward. Certain details of the engine installation will vary depending on whether you use a 2 stroke or 4-stroke engine. We will cover both installations, noting any peculiarities encountered.

1. First step in the fuselage assembly is to remove the canopy hatch. Near the back of the cabin you will find a slightly larger screw than the canopy screws lower on the fuselage than the canopy screws. Remove the screws (one per side) from both

sides and lift the back of the hatch, rotating the hatch away from the front dowels. Put the canopy hatch and the screws aside in a safe place out of the way.

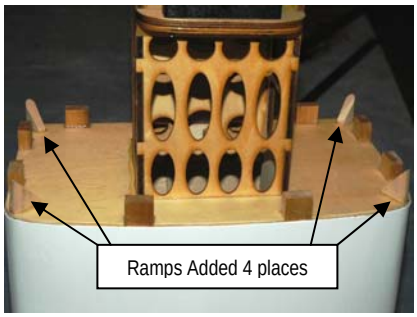
Canopy hatch removed☐

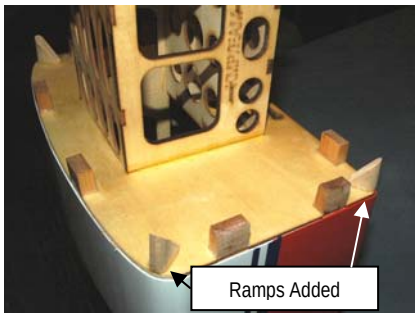
2. Using a straight edge, check the contouring of the cowl mounting blocks relative to the line of the fuselage. In the picture to the right the block has been sanded and tapered to match the fuselage. Check/correct all six mounting blocks – if they need it. IF you have to sand the surface then re-seal the wood afterwards with a few drops of thin CA.

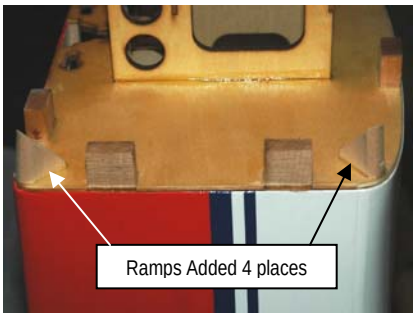


Cowl Mounting Blocks (x 6) fitted☐

3. As mentioned in the introductory comments, we welcome feedback from the field on what works for them; one such item had to do with making it easier to install the cowl. The Glasair cowl is very large and strong, but it is also rather flexible and it can be a chore getting it aligned all the way around the perimeter so it will push



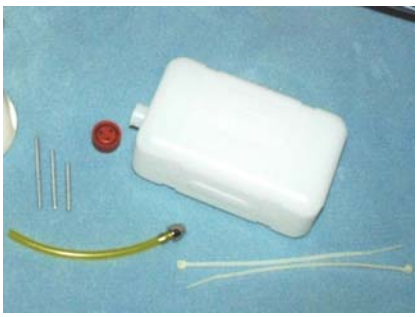




back over the firewall bulkhead. The suggestion made and shown here is to ADD some ramps (fabricated out of scrap wood)at the 4 corners of the firewall that will help guide the cowl into position. These are OPTIONAL, but we found that they help us align the cowl.

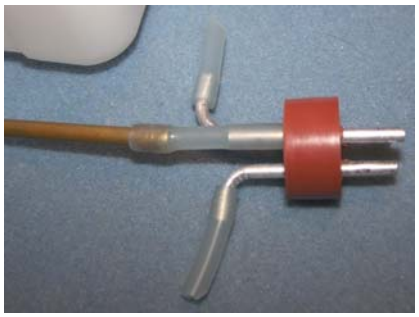
Corner Ramps (Optional) (x 4) installed☐

4. Locate all the tank hardware. The tank is supplied with a plastic clunk line suitable for use with gasoline fueled engines, for normal 2-stroke glow you can use a more-flexible silicone line possibly with a stiffener tube to prevent the line from folding back on itself



Corner Ramps (Optional) (x 4) installed☐

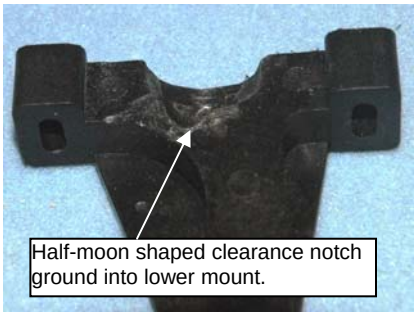
5. Bend two of the tubes into a fairly large radius right angle bend. When installed one of the tubes (overflow, capped during flight) will go the top of the tank, the other (muffler pressure) goes to the bottom. The engine fuel feed clunk line should be just about 10mm ($^{3}/_{8}$") short of the back of the tank. Install the tubes and



stopper, align the tubes and carefully tighten the wrap and tighten the tie strap that retains the stopper on the tank. When completed use a permanent marker to identify which tube is which – it WILL help you later!

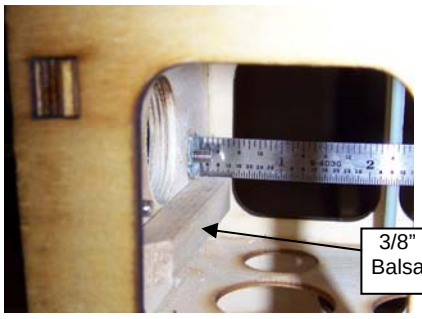
Fuel Tank Assembled ☐

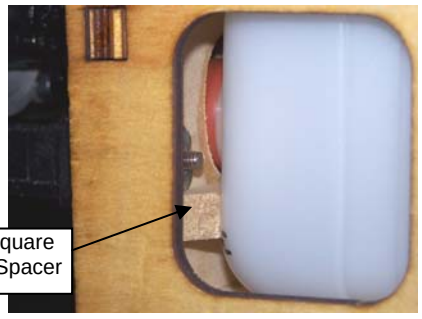
6. Slip the fuel tank into the tank compartment and slide it forward until the neck sticks through the hole in the firewall. Temporarily install the engine mounts using the supplied 4mm x 30mm bolts. With the side mounted engine the lower mount croses the fuel tank neck opening and will likely interfere with the fuel tank tube. The simple way out is to push the fuel tank back far enough to clear the mount. However, if you want to keep the tank as far forward as possible (thus minimizing the fuel draw) you will have to grind a clearance notch into the lower mount.



Engine Mount Cleared ☐

7. Remove the tank. With the engine mounts installed note that the two lower bolts will interfere with and potentially could puncture the fuel tank. To prevent that install a scrap wood spacer that keeps the tank from moving forward and





contacting the bolts. The spacer shown is a piece of 3/8" square balsa.

Tank Shim Installed ☐

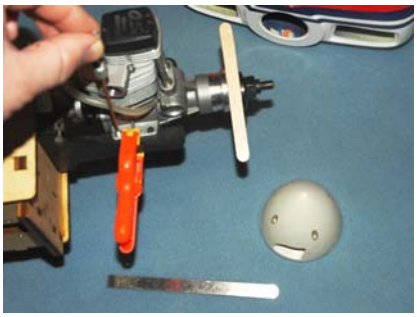
8. Slide the cowl into position all the way back against the fuselage. Measure the distance from the Engine mounting firewall to the nose ring of the cowl – in this example the distance was measured as 5.75” (146 mm), your dimension might be slightly different.

Measured Cowl Length _____

9. Install the engine mounts to the firewall using the supplied 4mm x 30mm bolts. Install these loosely enough to allow adjustment in width to fit the intended engine. Slip the engine into the mounts and hold in place with a rubberband. Align a straight edge with the front of the drive washer. Slide the engine fore or aft on the mount until the distance from the firewall to the drive washer is 1.5 mm to 3mm ($^{1}/_{16}$” - $^{1}/_{8}$”) greater than the cowl length measured in Step 3. For this example, the cowl length was measured in Step 3 was 5.75” (146 mm) so the target dimension: firewall to drive washer is 5.81” – 5.87 (147.5 - 149 mm)

Firewall to Drive Washer Target Dimension:_____ and Actual _____

10. When the engine position has been set, spot mark the location of the engine mounting holes on the mounts. The engine mount can be drilled either in place, or the mounts can be removed and set-up in a Drill Press Vise for drilling. Drill the mounts for the 3mm x 30 mm (or 6-32 x 1.25”) engine mounting bolts. OPTIONAL: If you have the proper tools, drill and tap the mount for the 3mm (or 6-32) engine mounting bolts. In any case, 3mm (or 6-32) lock nuts must be used to lock down the engine to the mounts.



Engine Mount Drilled ☐

11. Temporarily mount the engine in preparation for cowl fitting. Omit the muffler for now.

Engine Mounted ☐

12. Slide the cowl over the engine. Install the spinner backplate and use a spacer or a prop and “finger tighten” the prop nut to hold the backplate snugged against the prop drive washer. Double check alignment of the spinner to the cowl – it should be OK but if it is not you may be able to sand the back of the cowl to make it fit better.

With the cowl aligned to the spinner backplate, slip some shims (scrap balsa or cardboard work great) between the cowl and the spinner backplate to hold everything in position.

Cowl in Position ☐

13. Use a 1.5 mm ($^{1}/_{16}$") bit to drill the 6 cowl mounting blocks for the mounting screws. Install the screws as you go to help keep things aligned while the next hole is

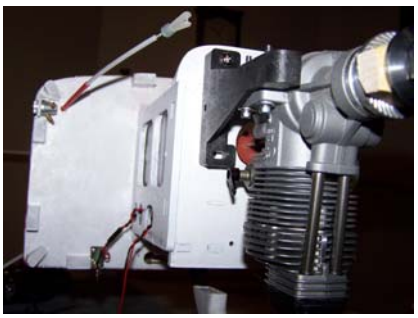
drilled. Remove the cowl and harden each drilled hole with a drop of thin CA.

Cowl Mounts Drilled & Hardened ☐

14. THIS STEP IS FOR 2-STROKE INSTALLATION ONLY. Shown below is a 2-stroke installation on a different aircraft; the Experimental Aircraft Models RV-7. The size of the model and the engine are somewhat smaller but the installation requirements are the same. With a side mounted engine you will want to use a Pitts style muffler. with the engine and muffler installed, use the "paper template" method described in steps 2 & 3 above to locate the exhaust pipes. Remove the muffler, install the cowl, and mark the exhaust tube exit positions. This is also a step where the old adage to "measure twice before cutting once" will come into play! Use tin snips to cut from the back of the cowl to the exhaust tube holes - this gets you close. Reinstall the muffler, slip the cowl into place and start filing, sanding, or grinding the cowl opening to fit the muffler. A Dremel grinding tool with a sanding drum used with care and patience will help you finish the job quickly. Strive for a minimum 3 mm (1/8") clearance between the exhaust tube and the cowl. In an effort to maintain a cleaner line, note that the sides of the cut follow the sides of the lower cowl scoop.

Cowl Fitted Over Muffler ☐

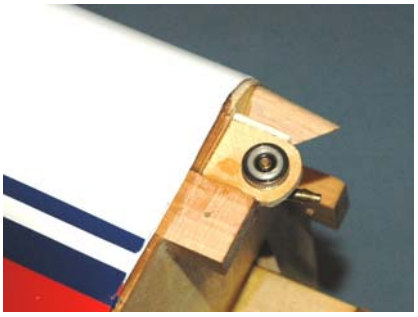
15. By the way, if you choose an inverted installation most of the steps are pretty much the same: EXCEPT the fuel tank neck will not interfere with the engine mount. The throttle pushrod location will be vastly different and you WILL have to cut a hole where the engine cylinder juts through the cowl. You may also have to cut holes to clear the muffler you choose. We still think the side mount is a better idea.



Under Cowl Installation Detailing

The Glasair cowl makes for a super clean installation, but access is blocked for simple things like fuel filling and glow plug access. To be sure, it is possible to simply cut access holes for the glow plug and it is possible to route some of the fuel tubing outside the cowl, but that can detract from the clean appearance. Thus we will install these features to improve accessibility.

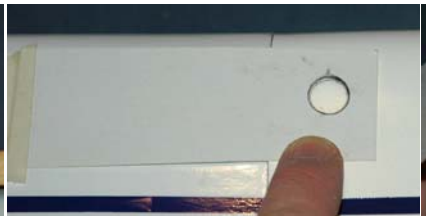
1. The Glasair has a very large cowl that prevents direct access to the fuel filler, so we will install a remote fuel filler. Shown here is a Great Planes Easy Fueler Valve (similar products also available from other sources) shown installed on a plywood mount epoxied to the upper starboard side of the firewall. The valve is positioned so that is flush with the surface of the cowl. It is shown on the Starboard side but could have just as easily been put on the bottom (where it would be out of sight but harder to access) or on top of the fuselage. With our 3-vent tank the filler valve will be used to fill the tank through the Muffler Pressure line.



Fuel Filler Valve Installed ☐

2. After installing, use the paper template method to locate a cut-out in the cowl side – this step is with the cowl removed. Cut the appropriate size round hole in a piece of card stock. Center that over the filler valve and tape it to the side of the

fuselage. Flip the paper template back and side the cowl into position. With the cowl aligned with at least 3 cowl screws, extend the template over the cowl and mark the position of the clearance hole on the cowl.

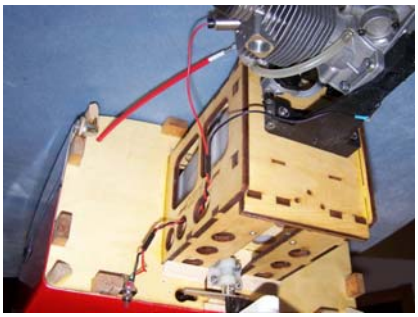
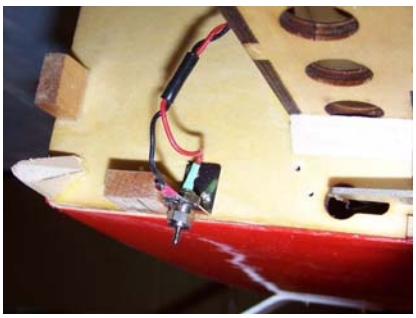


Fuel Filler Position Marked on Cowl ☐

3. Use a drill, a Dremel grinder and/or various round files to carefully cut the hole in the cowl and bring it up to size. Go slowly here, repositioning the cowl over the mounting bracket to assure that the access hole is aligned with the bracket. It looks really "Pro" when the filler is flush with the surface of the cowl and centered in its hole.

Fuel Filler Hole Cut In Cowl ☐

4. No matter whether you install a 2-stroke or a 4-stroke engine, with a side mounted engine, access to the glow plug will be restricted. While it is possible to use one of those long-stemmed glow lighters to reach through a (unsightly!) hole in the cowl to the glow plug, we think a far better solution is a remote igniter, located for access

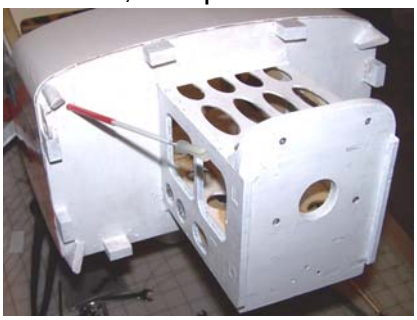
directly from below. In that position it will be out of the line of sight, protected, and not hard to find by touch. After installation, cut a clearance notch at the bottom rear edge of the cowl.

Remote Glow Wiring Installed ☐

5. Use the paper template method as shown in steps 2-3 to locate any other holes needed: Needle valve, Remote Glow plug access, or other.

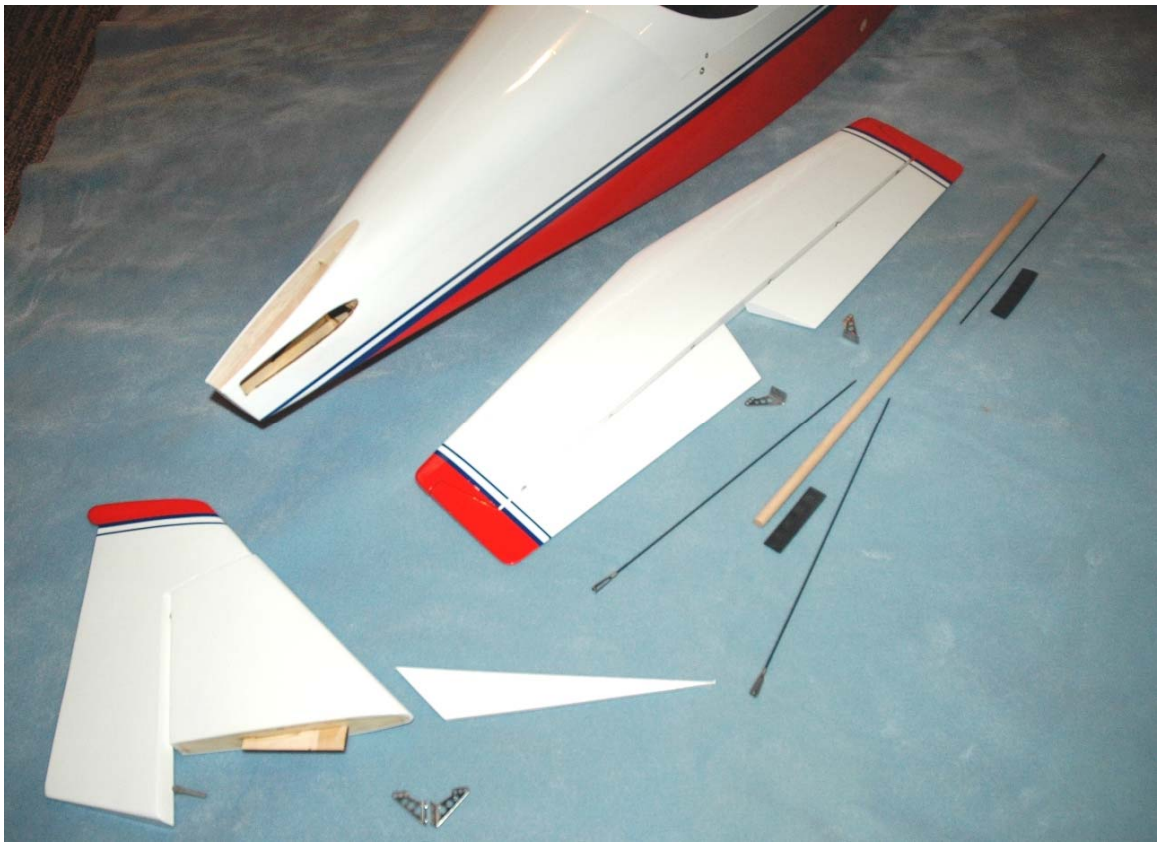
All Cowl Cut-Outs Completed ☐

6. This step is optional and cosmetic. Now all the holes are drilled, and pieces installed, remove everything that is removable and PAINT the firewall and front end wood structure; after all the Glasair's are all-metal and Fiberglass airframes! Use fuel proof dope (like Sig or Brodak) or polyurethane paint in the color of your choice. While you are at it spray clear works well to fuel proof some of the unreachable nooks and crannies of the forward fuselage behind the firewall too.



Front End Painting Completed☐

FUSELAGE & TAIL ASSEMBLY

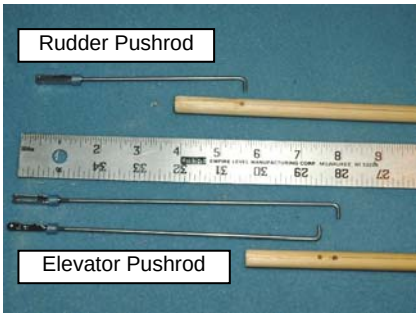


A note about rudder and elevator pushrods. The hardware shown above is supplied with the kit and is perfectly adequate for controlling your Glasair. However, as mentioned in the introductory comments, if you intend to fly your Glasair at an IMAA event, they will *insist* that you have 3mm or 4-40 sized control hardware.

If you have one of the early Glasair kits (supplied around January 2007) your kit has also been supplied with pull-pull cable for the rudder. However, this is not really a good fit with the kit because the rudder servo is substantially offset from the centerline

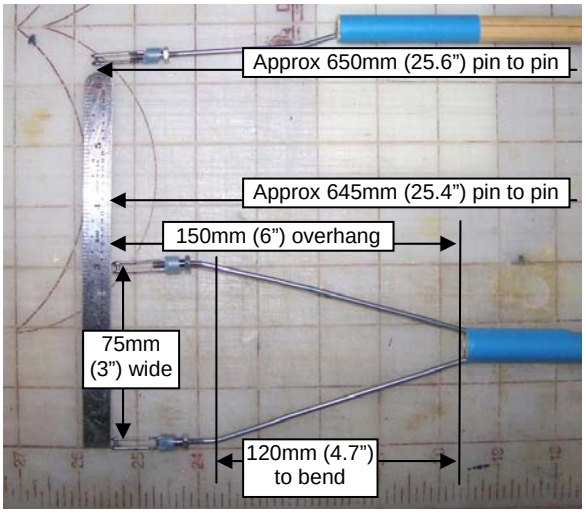
of the fuselage. Thus, this manual is going to show the construction of pushrods for the elevator and rudder using 4-40 rod ends affixed to $^3/_8$" dowel rods

1. We want the linkages to overhang past the dowel by about 150mm (6"). We also want the linkages to be anchored in holes at least 30mm to 40mm (1.2" to 1.6") from the end of the dowel rod. Thus start by bending all the linkage rods as shown. The rudder and one of the elevator links should be about 180mm (7") from the pin to the bend, the second elevator rod should be about 10mm ($^3/_8$") longer. Drill holes in the dowel rods to suit. Use Medium CA to affix the metal links to the wood dowels, then secure the joint using heat shrink tubing or heavy duty sewing thread



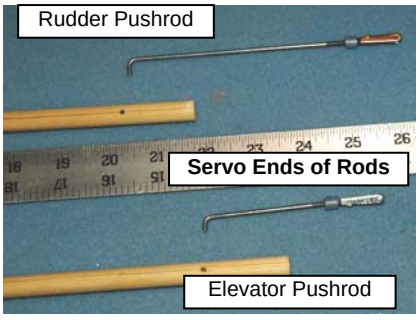
Elevator & Rudder Pushrods Assembled☐

2. The elevator and rudder pushrods need to be configured as shown in the picture to fit & function properly. The Rudder pushrod simply needs to be about 650mm (25.6") measured from pin to pin on the clevis. The pushrod shown also had some small Z-bends to improve the fit – there is no way to predict exactly what if any bends will re required –- just make sure the pushrod slides freely without interfering with the elevator rod - final adjustments are made with the servo arm and rudder centered.



Rudder Pushrod Completed ☐

3. Follow along with the picture. The two links at the output end of the elevator pushrod must be bent to form a "Y" as shown. The wire with clevis should overhang the end of the wood dowel by about 150mm (6"). The rod ends need to be equally bent so that about 120mm from the end of the dowel they reach a width of 75mm (3") The ends of the rods need to be bent back to parellel, maintaning the 75mm (3" dimension. The overall length of the rod is about 645mm (25.4") pin to pin - final adjustments are made with the servo arm and elevators centered.



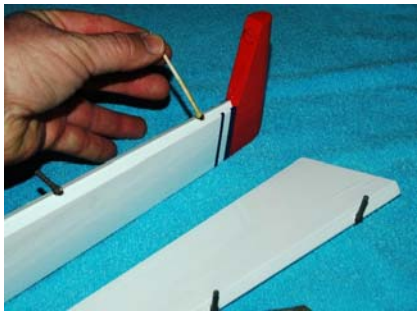
Rudder Pushrod Completed ☐

4. The Horizontal stabilzer is symetrical and technically can be installed with either side up. However, it looks better if the covering seam is out of view. Thus examine the stabilizer along the leading edge and determine where the covering

overlap seam is along the leading edge. Use the edge of that seam to determine the bottom of the stabilzer, use a marker to write BOTTOM at the center of the stab on the bottom side.

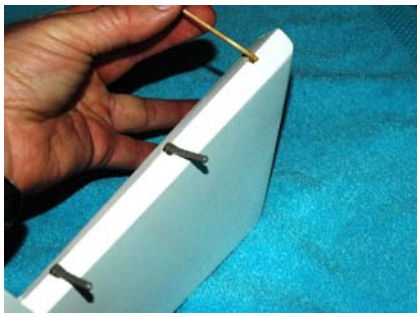
Bottom of Stabilizer Identified and Marked ☐

5. Before removing the elevators from the stabilizer, mark the elevators and the stabilizer on each side with either a # 1 or #2. In the picture the mark is just barely visible near the leading edge of the horn balance. Use a washable marker, or write the numbers on a piece of tape FIRST then transfer to each surface. Intent is to not lose track of which elevator is mated to which side of the stab. After marking remove the elevators. While you are at it, remove the rudder from the fin.



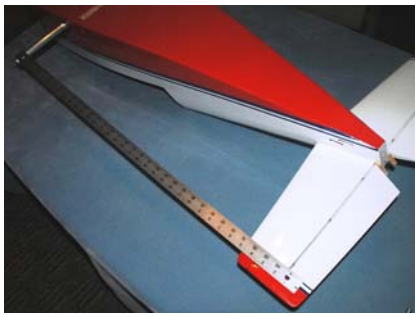
Elevators Marked & Removed ☐ Rudder Removed ☐

6. Remove all the hinge points, we will be installing them to JUST the movable surfaces first. Check all of the hinge pockets and clean up any execss covering ot other obstrction using a modeling knife. Epoxy the hinge points into just these surfaces. After the epoxy cures, check the hinges for free motion, chip away any excess epoxy and set these aside until they are needed again.



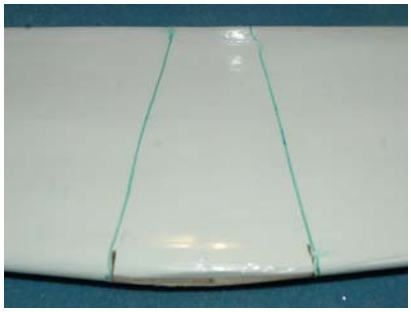
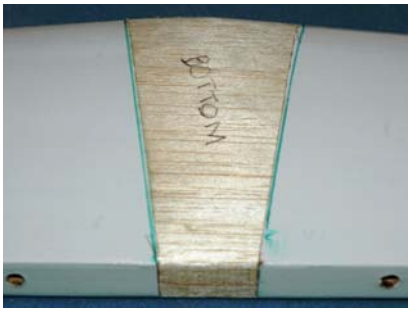
Hinges Epoxied into both Elevators ☐ To Rudder ☐

7. Next sequence is to align the stabilizer with the wing and prep the stab for installation. Slide the horizontal stabilizer (remember which side is the top!) into the fuselage and install the wing joiner tube. Temporarily install the elevators, then use some small wood or cardboard scraps as shims to center the elevators to the fuselage. Stick a straightpin through the rudder post and into the stab to hold its centered there. Next step is to align the stab with the wing tube. Measure from the back side of the wing tube to the hinge line of the stab on each side, Realign the stab until the measurement is the same on both sides.



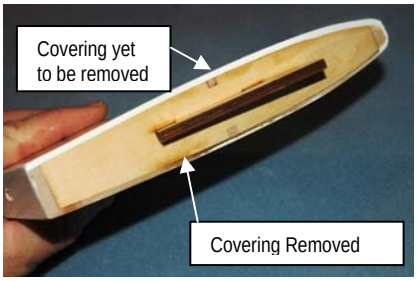
Stabilizer Aligned ☐

8. Use a felt tip pen to mark the position of the aligned stabilizer with the fuselage. The Ultracote covering MUST be removed between these two lines. Use the small

soldering iron to burn & seal the covering along the marker lines, remove the covering from the center of the stabilizer, then wipe off any remnants fo the marker.
Covering Removed ☐

9. Install the vertical fin and mark its intersection with the top of the fuselage. Again, this is where the Ultracote must be removed from the bottom of the fin and the top of the fuselage to assure a great bond. Use the small soldering iron to burn & seat the covering along the marker lines, remove the covering from the top center of the fuselage and from the fuselage under the base of the fin.



Covering Removed ☐

10. Install the horizontal stab using 30 minute epoxy and CA. Begin by applying a wet but not too globby coating of epoxy inside the top of fuselage – the top block that contacts the stab. Next apply a wet coat to the top of the stab not the bottom. Carefully slip the stab to just before the epoxied area. Lay a bead of epoxy on the previously wetted stab, next to where it is ready to enter the fuselage. Slide the stab in, that bead of epoxy should spread itself out along the way. When you get the stab all the way in place, the area where you cut the covering should guide you to aligning the stab, but measure it anyway to confirm alignment to the wing tube. Use some paper towels soaked with alchohol or acetone to clean up an excess epoxy on the surface of the stab.

Flip the fuselage over. again making sure the stab is aligned, wet the bottom stab to fuselage joint with medium CA. This will lock the stab into position and hold it while the epoxy cures.

Coat the bottom of the fin with epoxy, and slip the fin into position. This should pull the fin down into its slot, Back on top use any extra epoxy to fill in any remaining gaps around the stab or between the fin and the fuselage. Clean up the excess epoxy again, then let it sit until the epoxy cures out.

Stabilizer and Fin Installed ☐

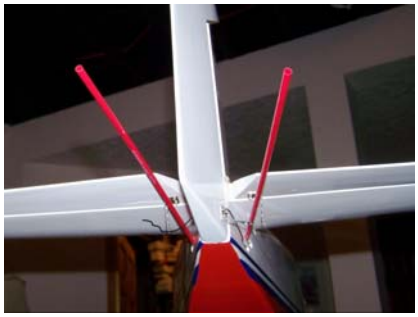
11. Back in step 1 we epoxied the hinge points to the movable surfaces. Now its time to finish the job. If you have not done so already, check out EVERY HINGE and make sure it moves freely and is free of excess epoxy. Remember the tape markers we put on the elevators - match them all up. Pre install and make sure every thing fits well in preparation for the final installation. Mix a batch of 30 minute epoxy. Using a toothpick, wet out and put a drop on each hinge point hole. Carefully install each control surface. Use $^{1}/_{32}$" balsa or thin cardboard shims to assure a uniform and close hinge gap on each surface. Allow to cure, preferably overnight. When cured, wiggle each control surface and inspect EVERY hinge for signs of globs of epoxy that could be interfering with free motion of the control surface.

Elevators & Rudder Installed ☐

12. The last tail piece to install is the dorsal fin. The Glasair has a relatively short tail – the extra side area afforded by the dorsal improves directional stability – do not leave it in the box. Take some care to properly align this piece! For alignment on the centerline of the fuselage, use the location of the top-most fuselage stringer, which is visible at the aft hatch bulkhead. Another good reference for centerline is the overlapping seam in the covering at the top of the fuselage. As always, remove a strip of covering from the top fuselage and the base of the fin leading edge. Also make sure to remove any covering overlapping the gluing surfaces of the dorsal. Use medium CA or epoxy to install the dorsal fin.

Dorsal Fin Installed ☐

13. Next install the Elevator Pushrod. The easiest way to do this is to start by installing a plastic tube in each of the UPPER fuselage slots under the stabilizer. Slide these forward until they reach the radio bay. Slip one end of



the "Y" pushrod into each of the plastic tubes, then push the rod into the fuselage; the plastic tubes will guide the ends of the "Y" out the slots in the fuselage.

Elevator Pushrod Installed ☐

14. Next install the Rudder Pushrod. You can use the plastic tube as a guide as you did with the elevator pushrod, but frankly the rudder pushrod is simple enough to just reach into the fuselage and poke around until you find the lower pushrod exit on the starboard side of the fuselage.

Rudder Pushrod Installed ☐

15. Next install the control horns. For the rudder, start by installing the horn on the clevis on the rudder pushrod. This will align it at the correct height. Next slide the base of the horn on the fore and aft on the rudder until the pushrod holes align with the hinge line. Put a pin in one hole to locate it while you drill the other. Then put a screw into the hole you just drill, remove the pin and drill the second hole.

Rudder Horn Installed ☐

16. When using a double ended pushrod it is imperative that the elevator horns be installed correctly and exactly opposite each other in order to assure that the elevators always move in complete unison. Start by loosely taping the FRONT of the pushrod to the center of the servo mounting bar up front. Better still; use a small piece of plastic over the wire so the pushrod will still move. Install an elevator horn on each clevis. Use some clamps or tape to hold both elevators in the neutral position. Position the horns an equal distance from the centerline of the fuselage, i.e., offset from the edge of the elevator by 12-16mm ($^{1}/_{2}$" to $^{5}/_{8}$") from the edge of the elevator. Use a pin in one of the horn mounting holes to hold its position on the elevator then drill.

Rudder Horn Installed ☐

Align the horn and link with the servo arm, align the horn as far forward as possible WITHOUT overhanging the beveled edge, then drill a 2mm ($^{5}/_{64}$") hole for each control horn screw. NOTE: in order to prevent drilling through the control surface use a drill stop. The middle picture shows a wheel collar affixed over the drill bit to assure that the hole is drilled just as deep as needed for the screw.

With the rear-most screws, you might want to cut off the excess screw length and file off the burr

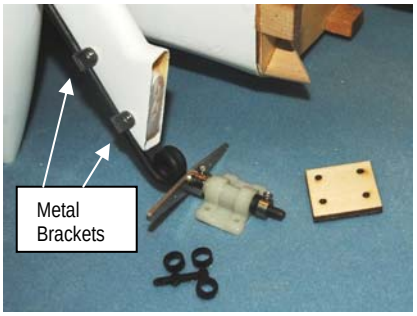
LANDING GEAR INSTALLATION

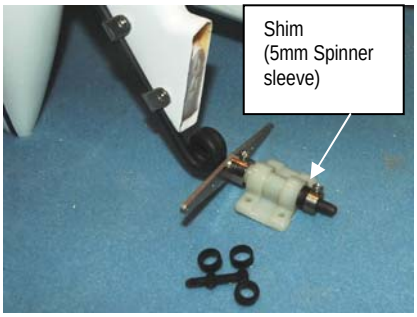
Fixed Trike Gear Set-up

1. Locate the nose gear fairing, wire, wheel, collars and straps. Take the wheel and colors off the wire.
   - ☐ Slip the wire into the fairing part way
   - ☐ Then slip a collar onto the wire
   - ☐ Then slip the wheel onto the wire
   - ☐ Then slip the second collar over the wire. DO NOT tighten anything yet.

2. Center the wheel in the fairing and lock down the collars to hold it in position. Allow enough clearance for the wheel to spin freely

Wheel Centered & Secured ☐





3. Fit on of the metal brackets over the wire and onto the fairing near the top. Drill the two 1.5mm ($^{1}/_{16}$") holes into the fairing where the bracket goes, and install the bracket screws. Repeat for the second bracket to be located somewhere midway along the wire and fairing juncture.

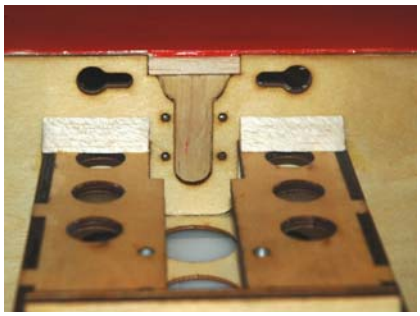
Wire to Fairing Brackets installed ☐

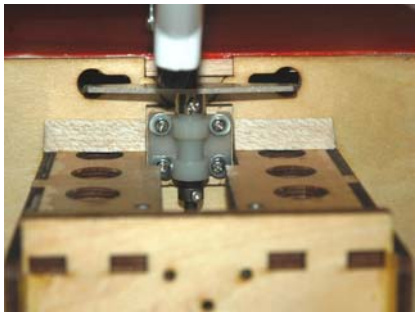
4. Slip the nose gear through the steering arm, note that a flat has been ground into the wire for the steering arm set screw. Slip the wire through the Nose Gear Block

and the wire collar, note that there is another flat ground into the wire where the top collar is installed. This may or may not be the case for your Glasair, but for the model assembled for this manual, we used the smallest (5mm) spacer supplied with the spinner as a filler piece to help reduce excess play in this assembly. Lock down all the set screws.

Nose Gear Assembled & Ready for Installation ☐

5. The Glasair is prepped for retracts including a notch cut into the firewall for clearance to the nose wheel when the retractable gear is used. If you are using the fixed gear the clearance notch is not required, in fact it can be come a leak zone for air and fuel from the cowl to enter the inside of the fuselage. Therefore it is recommended that you either cover or fill this clearance notch. Shown are a couple pieces of scrap balsa installed with silcone seal – thus removable if the retractable gear is ever used.



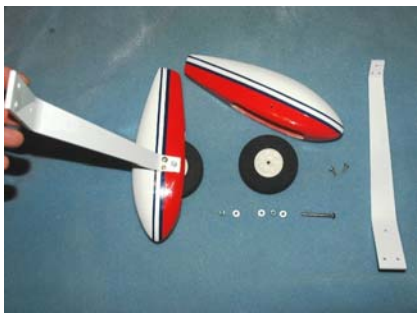


Retractable Wheel Clearance Notch Sealed ☐

6. Install the Nose gear pivot block with its wood spacer onto the firewall using the 3mm bolts provided.

Nose Gear Block Installed ☐

7. The main gear assembly begins with installing the wheels and wheel pants onto the main gear. Sort out the two 4mm x 40mm shoulder bolts, 6 washers and 4 lock nuts, as well as the main landing gear legs, wheels and wheel pants. Examine the main gear legs, note that they are not symmetrical. Install them with the gear swept forward; that is with the straight side of the gear forward and the tapered side in back.



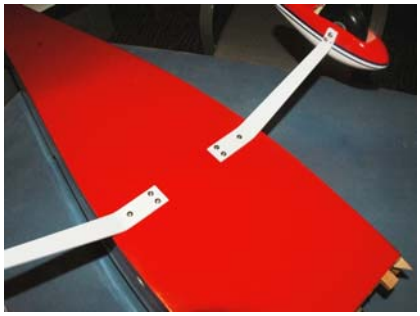
Main Gear Parts Identified ☐

8. Slip the 4mm axle bolt through the wheel and install one of the locking nuts then two of the washers. Slip this into the wheelpant and snug up the nut on the screw just enough to keep the wheel spinning freely but not rattling from side to side. slip the bolt through the main landing gear leg and loosely install the remaining lock-nut. Install the two 3mm washer

head bolts that secure the wheelpant to the gear leg then lock down the axle bolt. We drilled an access hole through the wheelpant to the outside just large enough for a screwdriver to make it easier to install the screw for the main wheel.

Main Wheels & Wheelpants Installed ☐

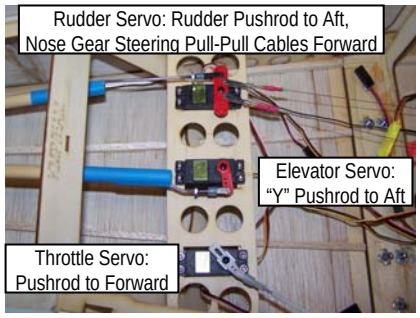
9. The Main Gear mounts are located under the covering just aft of the lower wing fairing. Cut away the covering to expose the mounts, and seal the edges of the covering.



Main Gear Installed ☐

RADIO SET-UP

1. The dual outputs on the elevator work best when the pushrod runs straight down the center of the fuselage. Some compromise versus "perfection" must be tolerated, but can be minimized by mounting the elevator servo in the center bay of the servo tray.


Rudder Servo: Rudder Pushrod to Aft, Nose Gear Steering Pull-Pull Cables Forward
Elevator Servo: "Y" Pushrod to Aft
Throttle Servo: Pushrod to Forward

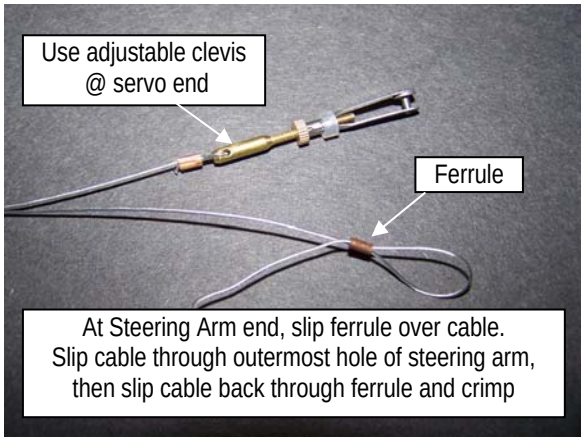
   The throttle servo go in on the side that gives best access to the throttle arm, in this case the throttle servo went into the starboard side location to align with the throttle arm, leaving the port servo bay for the Rudder/Nosegear servo. Drill pilot holes and mount the servos.

Fuselage Servos Installed ☐

2. The Rudder Pushrod to the tail should go to the Port side of the servo arm. Center the servo and adjust the pushrod to neutralize the rudder.

Rudder Pushrod Installed ☐

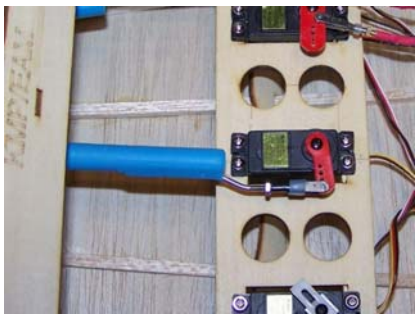
3. The Nose Gear Pull-Pull cable installation starts at the steering arm by first slipping one of the small copper tube ferrules over the cable. Next, route the cable through the outermost steering arm hole, then run the cable back through the ferrule and crimp the tube. Repeat for the cable at the other end of the steering arm.


Use adjustable clevis
@ servo end
Ferrule
At Steering Arm end, slip ferrule over cable.
Slip cable through outermost hole of steering arm,
then slip cable back through ferrule and crimp

   At the servo end, install the adjustable clevis half way onto the threaded brass coupler, then install the clevis to the innermost available hole on the servo arm. A note on steering: use the innermost available servo output – a little nosewheel steering goes a LONG way! Too much steering motion will make the Glasair hard to control. Route both pull-cables through the forward fuselage and back to the servo, making sure the cable does not foul anything along the way. Again slip the ferrule over the cable, slip the cable through the brass coupler, an back through the ferrule, but DO NOT CRIMP YET! Repeat the process for the other cable getting it ready but stopping short of crimping it. With the servo centered take you best shot at centering the nose wheel, then crimp the ferrules. Before you fly, take the Glasair out on the driveway or other smooth surface and roll it back an forth with the radio turned on and the rudder servo centered. Adjust the cables so that the Glasair rolls straight with the rudder control (and trim tab!) centered.

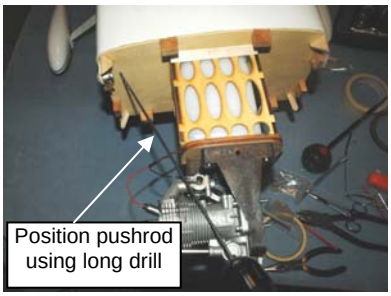
Nose Gear Pull-Pull Cables Installed ☐

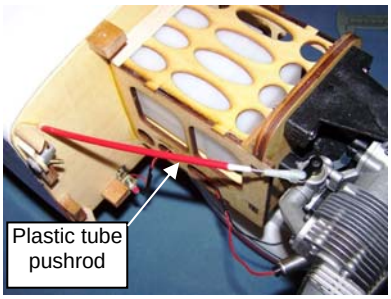
4. The elevator pushrod should be installed to the servo arm, and adjusted so the elevator is neutral with the servo arm centered.

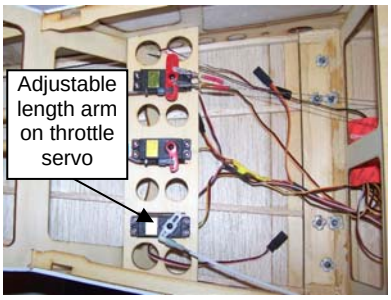


Nose Gear Pushrod Installed ☐

5. The throttle pushrod location depends on your engine and whether you choose to mount the engine side mount or inverted. In our model we also tried to keep the pushrod close to the fuselage side. With the engine installed determine where the throttle pushrod should pass through the firewall and drill a hole. Use that a guide to drill through the second bulkhead. In our model we also drilled a hole through the third bulkhead just ahead of the servos.

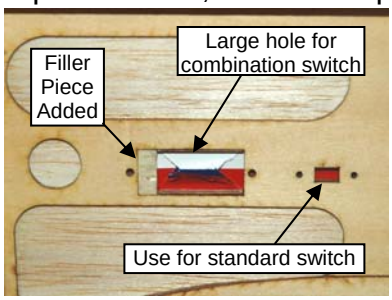


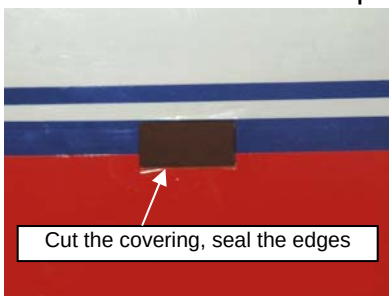




Throttle Pushrod Installed ☐

6. The Glasair kit provides two alternative places on the forward starboard side of the fuselage to mount the radio switch. The smaller opening is designed if you plan on using the normal switch (and separate charging harness) of the normal switch, the larger opening is for a combination switch with charging jack, as shown in the picture set below. This particular switch used was actually slightly smaller than the pre-cut hole, so the first picture shows how to fill in part of the hole to fit the switch.

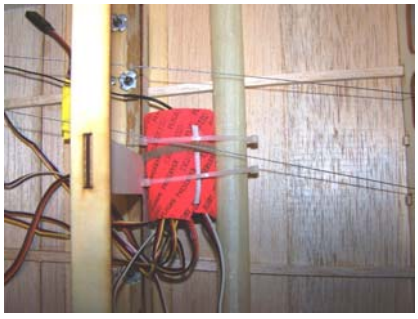




Note the covering has already been cut as a prelude to sealing the edges (middle picture) and finally, installing the switch.

Switch Installed ☐

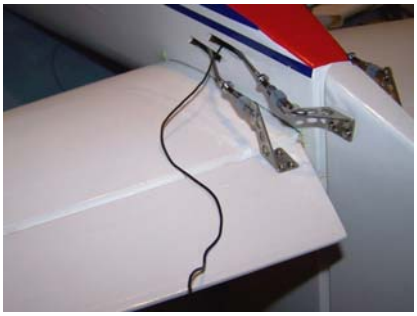
7. Before installing the receiver make sure all the servo connections, Y-harness connections and switch harness plugs are all fully and correctly installed. The radio receiver must be wrapped in foam rubber and secured in the fuselage. In this case it is lashed to the wing joiner tube sleeve with a couple wrap ties. It could have just as easily been secured to the center fuselage bulkhead.



Radio Receiver Installed ☐

8. The receiver antenna can be routed internally through the fuselage and exit out one of the pushrod holes.

Receiver Antenna Routed ☐



9. The radio battery pack must also be isolated in a foam rubber wrap and installed securely, however we will also take advantage of the weight of that component to help balance the Glasair. In this case the battery needed to go between the first and second bulkheads. It is offset to Port to counter the weight of the engine cylinder.

Radio Receiver Installed ☐

10. With all the control surfaces now hooked up and with the radio system "wired" lets check all of the surface throws at once. We recommend the following control surface movement for the initial flights. If your transmitter has dual rates use these as a guide:
    - ☐ Rudder, measured at the top of the Rudder trailing edge, each side of center: 15mm – 22mm ($^{5}/_{8}$" – $^{7}/_{8}$")
    - ☐ Elevator, measured at the trailing edge near the rudder, each direction from center: 10mm – 16mm (3/8" - 5/8")
    - ☐ Ailerons, measured at the wing tip end, each side of center: 10mm – 16mm (3/8" - 5/8")
    - ☐ Flaps, measured at the trailing edge from top of flap to top of wing: 7/8" (22mm) Try using about 7mm-10mm (1/4" to 3/8") for Takeoff and up to full deflection for landing. THE FLAPS WILL SLOW THE BIRD DOWN, be ready to keep some throttle on.

FINAL ASSEMBLY

1. WEIGHT AND BALANCE - This is probably the most critical assembly step you do! Be prepared to add nose weight to the model - this would not be unusual as the full-scale aircraft is designed to carry over a third of its empty weight forward of the firewall. It's a 'price' we pay for being scale. We recommend setting the balance of the model at 3 ¼" aft of the leading edge at the wind root, which is approximately the 25% chord line. Moving the balance point further forward, up to ½", will increase the pitch stability of the model. Err in that direction for the first few flights. Moving the balance point aft will decrease the pitch stability, giving a livelier feel - at the risk of being able to easier over-control the aircraft. Try our setting and then

feel free to experiment. The Glasair is a wonderfully stable and responsive model.

BENCH PRE-FLIGHT

- ☐ Make sure all clevises have their silicone keeper rings in place and as close to the servo or control arm as possible.
- ☐ Make sure all servos have their output arms held in place by the center screw
- ☐ Be sure the steering arm has been tightened – consider using loctite to secure
- ☐ Check that all control surfaces move freely
- ☐ Check that control surfaces are at the same relative angles – i.e. in line with the flying surface to which they are attached.
- ☐ Check that all control horns are firmly attached
- ☐ Check that all control surfaces are firmly hinged by tugging on them
- ☐ Put some fuel in the tank and make sure the plumbing is correct
- ☐ Check correct operation of control surfaces with your radio – that left is left, etc. Better still, have a flying buddy check it TOO!
- ☐ Go have fun and fly safely!

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